

REMARKS

Please reconsider the present application in view of the above amendments and the following remarks. Applicant thanks the Examiner for carefully considering this application.

Disposition of Claims

Claims 1 and 3-16 are pending in the present application. Claim 1 is independent. The remaining claims depend, directly or indirectly, from claim 1.

Claim Amendments

Independent claim 1 has been amended to clarify the invention recited and to correct typographic errors. Specifically, claim 1 has been amended to include a limitation: "a temporary bonding step of pressing the semiconductor chip onto the adhesive while heating the adhesive at the first temperature, wherein the pressing of the semiconductor chip onto the adhesive does not cause the connection terminal on the semiconductor chip to contact the connection terminal on the substrate." Support for this amendment can be found, for example, on p.11, line 19 - p.12, line 9 of the specification. No new matter is introduced by this amendment.

Rejection(s) under 35 U.S.C § 112

Claims 1 and 3-16 were rejected under 35 U.S.C § 112, second paragraph, as being indefinite for failing to particular point out and distinctly claim the subject matter which applicant regards as the invention.

(i) With regard to the antecedent rejection of “the connecting terminal” on line 17, Applicant has changed “connecting” to “connection.” Applicant thanks the Examiner for careful review of the claims.

(ii) The reaction rate (percentage) in claim 15 refers to the extent (percentage) of adhesive that has reacted, as explained on p. 19, lines 12-24 and illustrated in Table 2 on page 18. Specifically, on p. 19, lines 12-24, the reaction rate is defined in equation (1) as: $R(\%) = (1 - A_2/A_1) \times 100$, based on the calorific values of the sample before (A_1) and after (A_2) the temporary bonding step. As an example shown in Table 2 on page 18, different first temperatures may be used to achieve different reaction rates (reaction extents). For example, under an identical reaction condition (same adhesive and same duration for the temporary bonding step), different rates of reaction can be achieved with different first temperatures used for the temporary bonding step. Therefore, in light of this teaching in the specification, the meaning of the “reaction rate” is clear and one of ordinary skill in the art would know how to determine the “reaction rates” as claimed. Accordingly, withdrawal of this rejection is respectfully requested.

Rejection(s) under 35 U.S.C § 103

- (A) Claims 1, 3, 6, 7, 10, 11, 14, and 16 were rejected under 35 U.S.C § 103(a) as being obvious over Takeshita et al. Claim 1 has been amended. To the extent that this rejection may still apply to the amended claims, the rejection is respectfully traversed.

The present invention relates to methods for manufacturing electronic devices using a process that involves two bonding steps (temporary and permanent bonding steps). In this process, an adhesive coated on a substrate is first heated to a first temperature that is higher than the reaction

start temperature such that the viscosity of the adhesive is reduced. Then, in a temporary step, a semiconductor chip is pressed into the adhesive while the adhesive is kept at the first temperature. In addition, in the first temporary bonding step, the chip is pressed to an extent that does not cause the connection terminals on the chip to contact the connection terminals on the substrate.

Specifically, amended claim 1 includes the limitation: "pressing the semiconductor chip onto the adhesive while heating the adhesive at the first temperature, wherein the pressing of the semiconductor chip onto the adhesive does not cause the connection terminal on the semiconductor chip to contact the connection terminal on the substrate."

In contrast, Takeshita et al. discloses a method which involves the following steps: (i) lay the adhesive 70 on the conductive wires 74, 75; (ii) a press head heated to 80-120 °C is moved down to lightly press the adhesive 70; (iii) the adhesive is heated to turn into a semi-set state and the press head removed; (iv) an electric part 5 is laid on the semi-set adhesive; (v) the press head is heated to 180-250 °C and moved down to press the electric part 5; (vi) heat the adhesive 70 and the electric part 5 to liquefy the adhesive 70. (Col. 7, lines 26 – 59). In accordance with this method, the press head is removed after semi-setting the adhesive in order to lay the electric part on top of the semi-set electric. Therefore, the electric part is not pressed onto the adhesive while heating the adhesive at the first temperature, as required by the amended claim 1.

In view of the above, Takeshita et al. fails to teach or suggest all limitations of the amended claim 1. Therefore, claim 1 is patentable over Takeshita et al. Dependent claims 3, 6, 7, 10, 11, 14, and 16 should also be patentable for at least the same reasons. Accordingly, withdrawal of this rejection is respectfully requested.

- (B) Claims 4, 5, 8 and 9 were rejected under 35 U.S.C. § 103(a) as being obvious over Takeshita et al. in view of JP 2-226738 and JP 11-330162. Claims 4, 5, 8, and 9 depend from claim 1. Claim 1 has been amended. To the extent that this rejection may still apply to the amended claims, the rejection is respectfully traversed.

As noted above, Takeshita fails to teach or suggest all limitations of the amended claim 1. The Examiner relies on JP 2-226738 for teaching the use of processing tables and JP 11-330162 for teaching heating from the substrate side. These two references do not teach that which is missing in Takeshita et al. Therefore, a combination of Takeshita et al., JP 2-226738 and JP 11-330162 cannot teach or suggest all limitations of the amended claim 1. Therefore, amended claim 1 is patentable over Takeshita et al. in view of JP 2-226738 and JP 11-330162, and dependent claims 4, 5, 8, and 9 should also be patentable for at least the same reasons. Accordingly, withdrawal of this rejection is respectfully requested.

- (C) Claims 12 and 13 were rejected under 35 U.S.C. § 103(a) as being obvious over Takeshita et al. in view of JP 11-330162. Claims 12 and 13 depend from claim 1. Claim 1 has been amended. To the extent that this rejection may still apply to the amended claims, the rejection is respectfully traversed.


As noted above, Takeshita fails to teach or suggest all limitations of the amended claim 1. The Examiner relies on JP 11-330162 for teaching heating from the substrate side. JP 11-330162 does not teach that which is missing in Takeshita et al. Therefore, a combination of Takeshita et al. and JP 11-330162 cannot teach or suggest all limitations of the amended claim 1. Therefore, amended claim 1 is patentable over Takeshita et al. in view of JP 11-330162, and

dependent claims 12 and 13 should also be patentable for at least the same reasons. Accordingly, withdrawal of this rejection is respectfully requested.

Applicant believes this reply is fully responsive to all outstanding issues and places the present application in condition for allowance. If this belief is incorrect, or other issues arise, the Examiner is encouraged to contact the undersigned or his associates at the telephone number listed below. Please apply any charges not covered, or any credits, to Deposit Account 50-0591 (Reference Number 03310/033001).

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Respectfully submitted,

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